

Utility of PDL progenitors for in vivo tissue regeneration: a report of 3 cases.

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Public Summary:

Periodontitis is a chronic infectious disease of the alveolar bone and tissue surrounding and supporting the teeth, which is a major cause for tooth loss in adults. Recent scientific studies suggest that periodontal disease plays a role in a variety of systemic diseases such as diabetes mellitus, cardiovascular disease and premature low birth weight. Therefore, appropriate treatment for periodontal disease will benefit oral and systemic health overall. Classically, several regenerative approaches were proposed in the treatment of periodontal disease, including guided tissue regeneration (GTR), topical application of enamel matrix derivative (EMD), and various growth factors. However, research indicated that the efficacy of these treatments was lacking in that the regeneration of periodontal tissue was limited. Recently, identification of periodontal ligament stem cells (PDLSCs) presented an opportunity for utilizing stem cells to regain periodontal structures in these detrimental cases. Prior to PDLSC identification, we conducted autologous cell implantation for periodontitis treatment. Therefore, there was no knowledge on progenitor cell property of these implanted cells. In this study, we characterize stem cell features of implanted cells termed periodontal ligament progenitors (PDLPs) in comparison to PDLSCs. Then we examined the clinical outcome of three patients previously treated with autologous PDLPs in an effort to provide primary knowledge on the effectiveness of this treatment approach and preliminary clinical evidence for randomized controlled trial in the future. Clinical examination indicated that transplantation of PDLPs may provide therapeutic benefit for the periodontal defects. All treated patients showed no adverse effects during the entire course of follow up. We also found that PDLPs were analogous to PDLSCs in terms of high proliferation, expression of mesenchymal surface molecules, multipotent differentiation, and in vivo tissue regain. However, PDLPs failed to express scleraxis, a marker of tendon, as seen in PDLSCs. Conclusions: This study demonstrated clinical and experimental evidences supporting a potential efficacy and safety of utilizing autologous PDL cells in the treatment of human periodontitis.

Scientific Abstract:

OBJECTIVE: Periodontal disease is an inflammatory disorder with widespread morbidities involving both oral and systemic health. The primary goal of periodontal treatment is the regeneration of the lost or diseased periodontium. In this study, we retrospectively examined feasibility and safety of reconstructing the periodontal intrabony defects with autologous periodontal ligament progenitor (PDLP) implantation in three patients. **MATERIALS AND METHODS:** In this retrospective pilot study, we treated 16 teeth with at least one deep intrabony defect of probing depth (PD) > OR = 6 mm with PDLP transplantation and evaluated clinical outcome measures in terms of probing depth, gingival recession and attachment gain for a duration of 32-72 months. Furthermore, we compare PDLPs with standard PDL stem cells (PDLSCs) and confirmed that PDLPs possessed progenitor characters. **RESULTS:** Clinical examination indicated that transplantation of PDLPs may provide therapeutic benefit for the periodontal defects. All treated patients showed no adverse effects during the entire course of follow up. We also found that PDLPs were analogous to PDLSCs in terms of high proliferation, expression of mesenchymal surface molecules, multipotent differentiation, and in vivo tissue regain. However, PDLPs failed to express scleraxis, a marker of tendon, as seen in PDLSCs. **CONCLUSIONS:** This study demonstrated clinical and experimental evidences supporting a potential efficacy and safety of utilizing autologous PDL cells in the treatment of human periodontitis.